MM84 MULTIMETER

Instruction Manual

MARTINDALE ELECTRIC

GENERAL SAFETY INFORMATION: Always read before proceeding.

Warning
These instructions contain both information and warnings that are necessary for the safe operation and maintenance of this product. It is recommended that you read the instructions carefully and ensure that the contents are fully understood. Failure to understand and to comply with the warnings and instructions can result in serious injury, damage or even death.

In order to avoid the danger of electrical shock, it is important that proper safety measures are taken when working with voltages exceeding 30V AC rms, 42V AC peak or 60V DC.

This product must only be used by a competent person capable of interpreting the results under the conditions and for the purposes for which it has been constructed. Particular attention should be paid to the Warnings, Precautions and Technical Specifications. Always check the unit is in good working order before use and that there are no signs of damage to it. Do not use if damaged.

Where applicable other safety measures such as use of protective gloves, goggles etc. should be employed.

Please keep these instructions for future reference. Updated instructions and product information are available at: www.martindale-electric.co.uk

REMEMBER: SAFETY IS NO ACCIDENT

MEANING OF SYMBOLS:

CE	**Equipment complies with relevant EU Directives**
	End of life disposal of this equipment should be in accordance with relevant EU Directives
	Caution - risk of electric shock
	Caution - risk of danger & refer to instructions
	Equipment protected by double or reinforced insulation (Class II)
⎓	**Direct current (DC)**
~	**Alternating current (AC)**
⏚	**Earth (ground)**

Thank you for buying one of our products. For safety and full understanding of its benefits please read this manual before use. Technical support is available from 01923 441717 and support@martindale-electric.co.uk.

CONTENTS

11	**Introduction**	**1**
1.1	Inspection	1
1.2	Description	1
1.3	Accessories	1
2	**Product Specific Safety Information**	**2**
2.1	Precautions	2
3	**Operation**	**4**
3.1	General	4
3.2	Low Battery Indication	4
3.3	Description of Terminals	4
3.4	Description of Press Buttons	4
3.5	Description of LCD Symbols	5
3.6	Incorrect Connection Warning	5
3.7	Auto Power Off	5
3.8	Data Hold	5
3.9	AC & DC Voltage Measurement	5
3.10	AC & DC Current Measurement	6
3.11	Resistance Measurement	6
3.12	Frequency Measurement	6
3.13	Duty Cycle Measurement	6
3.14	Continuity Testing	7
3.15	Diode Testing	7
3.16	Logic Testing	7
4	**Maintenance**	**8**
4.1	Battery Replacement	8
4.2	Fuse Replacement	8
4.3	Test Lead Replacement	9
4.4	Calibration	9
4.5	Cleaning	9
4.6	Repair & Service	9
4.7	Storage Conditions	10
5	**Warranty**	**10**
	Specifications	

1. INTRODUCTION

1.1 Inspection

Examine the shipping carton for any sign of damage. Inspect the unit and any accessories for damage. If there is any damage then consult your distributor immediately.

1.2 Description

The MM84 is a 4½ digit multimeter with the following functions:

- True rms AC voltage to 750V
- DC voltage to 1000V
- True rms AC current to 20 A
- DC current to 20A
- Resistance to 20MΩ
- Frequency to 200kHz
- Continuity with audible indication
- Diode testing
- Duty cycle
- Logic test

Further functions are:

- Data hold
- Auto power off
- Incorrect connection warning

1.3 Accessories (included)

- TL16 test leads
- Holster
- 9V battery (installed)
- Instructions

1.4 Battery Installation

Refer to section 4.1 (Battery Replacement) for the battery installation instructions for the MM84.

2. PRODUCT SPECIFIC SAFETY INFORMATION

Measurement Category II (CAT II) is applicable to test and measuring equipment connected directly to utilization points (socket outlets and similar points) of the low-voltage MAINS installation.

2.1 Precautions

This product has been designed with your safety in mind, but please pay attention to the following warnings and cautions before use.

⚠ Warning
Before use check the unit for cracks or any other damage. Make sure the unit is free from dust, grease and moisture. Also check any associated leads and accessories for damage. Do not use if damaged.

⚠ Warning
Do not use if the rear casing is not fitted.

⚠ Warning
When this unit is used in combination with test leads, the measurement category of the combination is the lower measurement category of either this unit or the test leads used. Likewise if test lead accessories such as crocodile clips are also used, the measurement category will be the lowest measurement category in that combination.

⚠ Warning
Always test this unit on an appropriate proving device or known voltage source before and after using it to determine if a hazardous voltage exists in a circuit to be tested.

⚠ Warning
When using test leads, always keep your fingers behind the finger guard on the test lead probe.

⚠ Warning
Measuring a voltage that exceeds the specified limits of the unit may damage the unit and expose the operator to a shock hazard. Always check the unit's specified limits before use.

⚠ Caution
Avoid severe mechanical shock or vibration and extreme temperature.

⚠ Caution
Remove the batteries when not in use for an extended period, to avoid corrosion from leaking batteries.

3. OPERATION

3.1 General

If the multimeter does not measure current on the µA/mA ranges, the internal fuse (F1) may have blown (see section 4.2 Fuse Replacement).

If the multimeter does not measure current on the 20A range the internal fuse (F2) may have blown (see section 4.2 Fuse Replacement).

If the magnitude of a parameter to be measured is unknown, but known to be within the maximum safe limits of the multimeter, then manually set the range to maximum. For example if measuring DC voltage and the voltage magnitude is unknown, set the range to 1000V, then if required select autoranging for a satisfactory reading.

If the multimeter displays 1 with all other digits remaining blank then the measurement limits of the range have been exceeded.

3.2 Low Battery Indication

If the 🔋 symbol is displayed then the battery needs replacing (see section 4.1 Battery Replacement).

3.3 Description of Terminals

20A	Input terminal for AC & DC current measurements to 20A
µA mA	Input terminal for AC & DC current measurements to 200mA
COM	Common terminal for all measurements.
VΩHz	Input terminal for AC & DC voltage, resistance, continuity, diode, frequency, duty cycle and logic measurements.

3.4 Description of Press Buttons

POWER	Switches on/off the MM84
DATA HOLD	Activates/deactivates the data hold function

3.5 Description of LCD Symbols

▶|	Diode testing function is selected
H	Auto hold is selected
LOGIC	Logic function is selected
%	Duty cycle function is selected
mV, V, µA, mA, Ω, kΩ, MΩ, kHz	Units of measurement being displayed
🔋	Indicates battery is low
AC	Indicates AC measurement range selected
DC	Indicates DC measurement range selected

3.6 Incorrect Connection Warning

If a test lead is connected to the µA mA or 20A input sockets when a voltage range is selected then a warning buzzer will sound.

3.7 Auto Power Off

The MM84 will auto power off after approximately 45 minutes of inactivity.

3.8 Data Hold

To hold a displayed value press the **DATA HOLD** button. The LCD will display **H**.

To exit display hold press the **DATA HOLD** button again.

3.9 AC & DC Voltage Measurement

Connect the black test lead to the COM terminal and the red test lead to the ▶| ◆ **%HzV**Ω terminal.
Set the rotary switch to either **V~ or V ⎓** and the required range.
Taking all necessary safety precautions connect the test leads to the circuit being measured and read the measured voltage from the display.

3.10 AC & DC Current Measurement
Connect the black test lead to the **COM** terminal and the red test lead to the **µA mA** or **20A** terminal depending on the magnitude of current to be measured.
Set the rotary switch to either A~ or A⎓ and the required range.
Taking all necessary safety precautions connect the test leads in series with the circuit being measured and read the measured current from the display.

3.11 Resistance Measurement
Connect the black test lead to the **COM** terminal and the red test lead to the ⊣▶ ◆ **%HzV**Ω terminal.
Set the rotary switch to Ω and the required range.
Taking all necessary safety precautions connect the test leads to the circuit being measured and read the measured resistance from the display.

3.12 Frequency Measurement
Connect the black test lead to the **COM** terminal and the red test lead to the ⊣▶ ◆ **%HzV**Ω terminal.
Set the rotary switch to **Hz** and the required range.
Taking all necessary safety precautions connect the test leads to the circuit being measured and read the measured frequency from the display.

3.13 Duty Cycle Measurement
Connect the black test lead to the **COM** terminal and the red test lead to the ⊣▶ ◆ **%HzV**Ω terminal.
Set the rotary switch to **DUTY%**.
Taking all necessary safety precautions connect the test leads to the circuit being measured and read the measured % duty cycle from the display.

3.14 Continuity Testing
Connect the black test lead to the **COM** terminal and the red test lead to the ⊣▶ ◆ **%HzV**Ω terminal.
Set the rotary switch to •)) .
Taking all necessary safety precautions connect the test leads to the circuit being tested.
The buzzer will sound if the resistance is <150Ω.

3.15 Diode Testing
If the diode to be tested is in circuit be sure the circuit power is switched off.
Connect the black test lead to the **COM** terminal and the red test lead to the ⊣▶ ◆ **%HzV**Ω terminal.
Set the rotary switch to ⊣▶.
Taking all necessary safety precautions connect the test leads to the diode being tested.
If the diode is good a forward bias will give a display reading of around 0.6V (silicon diode) and a reverse bias will give a display of OL. If the diode is shorted or open circuit the display will indicate approx 0V or OL respectively for both forward and reverse bias.

3.16 Logic Testing
Connect the black test lead to the **COM** terminal and the red test lead to the ⊣▶ ◆ **%HzV**Ω terminal.
Set the rotary switch to ◆ **LOGIC**. The LCD will display **LOGIC**.
Taking all necessary safety precautions connect the test leads to the circuit being tested.
A logic 0 (Lo) will be indicated by a ▼ on the display.
A logic 1 (Hi) will be indicated by a ▲ on the display and the MM84 buzzer will sound.

4. MAINTENANCE

4.1 Battery Replacement
⚠ To avoid shock or injury, disconnect the multimeter from any external circuits or components and remove the test leads before proceeding.

The battery is replaced by removing the rear casing of the MM84. The rear casing is secured to the front by 3 screws and two internal snaps at the LCD end.

Remove the rear casing by removing the three screws from the rear casing. Gently lift the input terminal end of the rear casing until it unsnaps from the casing top.

Fit a new 9V, NEDA 1604, JIS006P, IEC 6F22 battery observing correct polarity.

NOTE: It is essential to transfer the protective insulating sleeve from the old battery to the new battery.

Replace the rear casing by snapping it into position and re-install the three screws.

4.2 Fuse Replacement
⚠ To avoid shock, injury or damage to the multimeter, disconnect the multimeter from any external circuits or components and remove the test leads before proceeding.
⚠ Replace only with the fuse specified.

The fuses are replaced by removing the rear casing of the MM84. Follow the procedure of section 4.1 (Battery Replacement) to remove the rear casing.

Replace F1 only with the original type F500mA/600V, fast acting ceramic fuse and replace F2 only with the original type F20A/600V High Energy, fast acting ceramic fuse.
Replace the rear casing and screws.

4.3 Test Lead Replacement
If the test leads become damaged they should be replaced.
⚠ The replacement test leads must have the same (or better) overvoltage category rating as the TL16 leads supplied.

4.4 Calibration
To maintain the integrity of measurements made using your instrument, Martindale Electric recommends that it is returned at least once a year to an approved Calibration Laboratory for recalibration and certification.

Martindale Electric is pleased to offer you this service. Please contact our Service Department for details.
Email: service@martindale-electric.co.uk
Tel: 01923 650660

4.5 Cleaning
The unit may be cleaned using a soft dry cloth. Do not use moisture, abrasives, solvents, or detergents, which can be conductive.

4.6 Repair & Service
There are no user serviceable parts in this unit other than those that may be described in section 4. Return to Martindale Electric if faulty. Our service department will quote promptly to repair any fault that occurs outside the guarantee period.

Before the unit is returned, please ensure that you have checked the unit, fuses, test leads and battery.

4.7 Storage Conditions
The instrument should be kept in warm dry conditions away from direct sources of heat or sunlight, and in such a manner as to preserve the working life of the unit. It is strongly advised that the unit is not kept in a tool box where other tools may damage it.

5. WARRANTY AND LIMITATION OF LIABILITY
This Martindale product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is 2 years and begins on the date of receipt by the end user. This warranty extends only to the original buyer or end-user customer, and does not apply to fuses, disposable batteries, test leads or to any product which, in Martindale's opinion, has been misused, altered, neglected, contaminated, or damaged by accident or abnormal conditions of operation, handling or storage.

Martindale authorised resellers shall extend this warranty on new and unused products to end-user customers only but have no authority to extend a greater or different warranty on behalf of Martindale.

Martindale's warranty obligation is limited, at Martindale's option, to refund of the purchase price, free of charge repair, or replacement of a defective product which is returned to Martindale within the warranty period.

This warranty is the buyer's sole and exclusive remedy and is in lieu of all other warranties, expressed or implied, including but not limited to any implied warranty of merchantability or fitness for a particular purpose. Martindale shall not be liable for any special, indirect, incidental or consequential damages or losses, including loss of data, arising from any cause or theory.

Since some jurisdictions do not allow limitation of the term of an implied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. If any part of any provision of this warranty is held invalid or unenforceable by a court or other decision-maker of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision or other part of that provision.

Nothing in this statement reduces your statutory rights.

MARTINDALE ELECTRIC

Specification
MM84
True RMS Digital Multimeter

ELECTRICAL SPECIFICATIONS
All specified accuracies are at 23°C ± 5°C, <75% RH for 1 year
Temperature Coefficient: 0.1 x (specified accuracy) per °C. (0°C to 18°C, 28°C to 50°C)

DC Voltage

Range	Resolution	Accuracy
200mV	0.01mV	± (0.05 % of rdg + 3 dgts)
2V	0.0001V	
20V	0.001V	
200V	0.01V	
1000V	0.1V	

Input impedance: 10MΩ
Overload protection: 1000V DC or 750 AC rms
500V DC or 350 AC rms on the 200mV range

True RMS AC Voltage

Range	Resolution	Accuracy
200mV	0.01mV	50Hz to 500Hz ± (1.0 % of rdg + 10 dgts) 500Hz to 2kHz ± (2.0 % of rdg + 20 dgts)
2V	0.0001V	
20V	0.001V	
200V	0.01V	
750V	0.1V	50Hz to 500Hz ± (2.0 % of rdg + 20 dgts)

MARTINDALE ELECTRIC

Specification
MM84
True RMS Digital Multimeter

AC coupled true rms specified from 5% to 100% of range
Crest factor: ≤3
Input impedance: 10MΩ
Overload protection: 1000V DC or 750 AC rms
500V DC or 350 AC rms on 200mV range

DC Current

Range	Resolution	Accuracy	Voltage Burden
200µA	0.01µA	± (0.5 % of rdg + 5 dgts)	300mV
2mA	0.0001mA		300mV
20mA	0.001mA		300mV
200mA	0.01mA		600mV
20A *	0.001A	± (2.0 % of rdg + 10 dgts)	800mV

* Current on 10 A range applied for 30 seconds maximum
Overload protection:
0.5A/600V fast blow ceramic fuse on 200µA to 200mA ranges
20A/600V fast blow ceramic fuse on 20A range

True RMS AC Current (50Hz to 1kHz)

Range	Resolution	Accuracy	Voltage Burden
200µA	0.01µA	± (0.8 % of rdg + 10 dgts)	300mV
2mA	0.0001mA		300mV
20mA	0.001mA		300mV
200mA	0.01mA		600mV
20A *	0.001A	± (2.5 % of rdg + 10 dgts)	800mV

Specification
MM84
True RMS Digital Multimeter

* Current on 10 A range applied for 30 seconds maximum
AC coupled true rms specified from 5% to 100% of range.
Crest factor: ≤ 3.
Overload protection:
0.5A/600V fast blow ceramic fuse on 200µA to 200mA ranges
20A/600V fast blow ceramic fuse on 20A range

Resistance

Range	Resolution	Accuracy
200Ω	0.01Ω	± (0.25% of rdg + 10 dgts)
2kΩ	0.0001kΩ	± (0.15% of rdg + 3 dgts)
20kΩ	0.001kΩ	
200kΩ	0.01kΩ	
2MΩ	0.0001MΩ	± (0.25% of rdg + 10 dgts)
20MΩ	0.001MΩ	± (1.0% of rdg + 10 dgts)

Open circuit voltage: 3.3V DC approx.
Overload protection: 500V DC or AC rms.

Frequency

Range	Resolution	Accuracy
2 kHz	0.1 Hz	± (0.5 % of rdg + 3 dgts)
20 kHz	1 Hz	
200 kHz	10 Hz	

Input sensitivity: 50mV rms minimum for sine wave
400mV rms minimum at >30% and <70% duty cycle
Minimum input: 22Hz range > 2Hz, 220Hz range > 20Hz
Minimum pulse width: >2µs at >10Hz
Overload protection: 500V DC or AC rms

Specification
MM84
True RMS Digital Multimeter

Duty Cycle

Range	Frequency Range	Resolution	Pulse Width	Accuracy (5V Logic)
0% to 90%	20Hz to 20kHz	0.1 %	>10 us	±(2.0% rdg + 10 dgts)

Overload protection: 500V DC or AC rms

Continuity
Audible indication: <150Ω
Response time: Approx 500ms
Open circuit voltage: 3.3V DC approx
Overload protection: 500V DC or AC rms

Diode Test

Range	Resolution	Test Current	Open Circuit Voltage	Accuracy
2V	0.1mV	1.0 mA	3.3V DC approx	± (0.5% rdg + 1 dgt)

Overload protection: 500V DC or AC rms

Logic Test

Thresholds		Pulse Rise Time (Max)	Pulse Repetition Rate (Max)	Pulse Width (Min)
Logic 1 (Hi)	Logic 0 (Lo)			
2.8V ± 0.8V	0.8V ± 0.5V	10µs	1 Mpps	25ns

Duty cycle: > 20% and < 80%
Frequency response: 20 MHz
Overload protection: 500V DC or AC rms

Specification
MM84
True RMS Digital Multimeter

GENERAL SPECIFICATIONS
Display: 4½ digit liquid crystal display with a maximum reading of 19999
Analog bargraph: 22 segments with measurement 20 times per second
Polarity: Automatic, positive implied, negative polarity indication
Overrange: Most significant digit displays "1"
Low battery indication:
symbol is displayed when the battery voltage drops below the operating level
Measurement rate: 2.5 times per second, nominal
Auto power off: After approx 45 minutes
Operating environment: 0°C to 50°C at < 70% RH
Storage temperature: -20°C to 60°C at < 80% RH
Altitude: Up to 2000m
Power: Single standard 9 volt battery, NEDA 1604, JIS006P, IEC 6F22
Battery Life: 300 hours typical with carbon-zinc
Dimensions: 189 (H) x 87 (W) x 37 mm (D)
Weight: 330g approx. including battery
Includes: TL16 test leads, holster, 9V battery (installed) and instructions.

SAFETY:
Conforms to BS EN61010-1, CAT II 1000V DC, 750V AC
Class II Double Insulation
Pollution Degree: 2

TL16 test leads conform to BS EN61010-031, CAT III 1000V, CAT IV 600V, 10A

EMC: Conforms to BS EN 61326

Check out what else you can get from Martindale:

- 17th Edition Testers
- Accessories
- Calibration Equipment
- Continuity Testers
- Electricians' Kits
- Environmental Products
- Full Calibration & Repair Service
- Fuse Finders
- Digital Clamp Meters
- Digital Multimeters
- Labels
- Microwave Leakage Detectors
- Motor Maintenance Equipment
- Multifunction Testers
- Non-trip Loop Testers
- Pat Testers & Accessories
- Phase Rotation Testers
- Proving Units
- Socket Testers
- Thermometers & Probes
- Test Leads
- Voltage Indicators
- Specialist Metrohm Testers (4 & 5kV)
- Specialist Drummond Testers

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